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CLAIMS

1. A method of separating a component from a metal based composite, the method including the steps of increasing the size of a component within the metal based composite by heating the metal based composite, crushing the metal based composite and then separating of the increased sized component from the other components of the composite.

2. The method according to claim 1 wherein the metal based composite is heated to a temperature of between about 1500°C and about 1650°C.

3. The method according to claim 1 or claim 2 wherein the metal based composite is held at a temperature of between 1500°C and 1650°C for a time of between about 0.5 hours and about 10 hours.

4. The method according to any one of the previous claims wherein the component increases in size to between about 15 μm and about 100 μm.

5. The method according to any one of the previous claims wherein the metal based composite is a metal matrix composite made up of at least two components where one is a metal.

6. The method according to any one of the previous claims wherein the metal is titanium, yttrium or copper.

7. The method according to any one of the previous claims wherein the metal based composite is a combination of a metallic base and a reinforcing non-metallic component.

8. The method according to claim 7 wherein the non-metallic component is a ceramic material.

9. The method according to any one of the previous claims wherein the metal based composite is a metal-ceramic composite where the major component makes up greater than about 50% of the composite.

10. The method according to any one of the previous claims wherein the materials or phases that make up the metal based composite include metallic phases, intermetallic phases, oxides, nitrides, carbides or silicates.

11. The method according to any one of the previous claims wherein the metallic phases, intermetallic phases and oxides include Ti(Al,O), $Ti_3Al(O)$ and TiAl(O) and Al_2O_3.

12. The method according to any one of the previous claims wherein the component that increases in size in the metal based composite is Al_2O_3.

13. The method according to claim 12 wherein the mean particle size of the Al_2O_3 is increased by the heat treatment which brings about coarsening of the Al_2O_3 particles.

14. The method according to any one of the previous claims wherein the composite is crushed and/or milled following treatment to form a powder and to decrease the size of a component in comparison to other components.

15. The method according to claim 14 wherein the milling occurs in an inert environment such as under argon or a vacuum.

16. The method according to claims 14 or 15 wherein the milling time is limited to minimise reduction of the increased size of the component.

17. The method according to any one of claims 14 to 16 wherein the powder is mixed with surfactant and water to produce a suspension.

18. The method according to claims 14 to 17 wherein separation of the components is achieved by sieving, sedimentation, electrophoresis, electrostatic methods, chemical leaching, or the like.

19. The method according to any one of the previous claims wherein the process produces a metal rich powder having a volume fraction of the metal component greater than about 70%.

20. The method according to claim 19 wherein the volume fraction is greater than 90%.

21. The method according to claim 19 or 20 wherein the powder is reacted with a reducing agent or a rare earth metal.

22. The method according to anyone of claims 19 to 21 wherein the oxygen content of the metal phase is less than about 1.5 atomic %.

23. Titanium rich powder when produced by the method of any one of the previous claims.

24. The titanium rich powder according to claim 23 wherein the Al_2O_3 content of the titanium rich powder is less than 30% and more preferably less than 15%.

25. The titanium rich powder according to claim 23 wherein the oxygen content in the titanium phase of the powder is less than 1.5 atomic percent.